

PRIVILEGED AND CONFIDENTIAL  
ATTORNEYS' WORK PRODUCT

Covington & Burling DRAFT -

August 3, 1987

SUMMARY OF DATA ON CARBON DIOXIDE

Abstract. Carbon dioxide is formed naturally during cigarette smoking, and accounts for about 13 percent of all mainstream smoke components. Carbon dioxide is also used in the manufacture of cigarettes to expand tobacco. In this process, tobacco is saturated with carbon dioxide and then passed through a high temperature heat stream. The heat causes the carbon dioxide to volatilize, and the physical action of the volatilization causes the tobacco to expand. Virtually none of the carbon dioxide remains in the tobacco.

Physical alterations in the tobacco are produced during the expansion process. However, these are attributed primarily to the process itself rather than specific chemical alterations caused by carbon dioxide. The expansion process results in a reduction of tobacco weight and nicotine. These changes are reflected in the lower tar and nicotine content of the smoke from cigarettes made with expanded tobacco.

Studies described in Appendix 1 have shown that exposure to carbon dioxide at sufficiently high levels could have adverse health effects, but the carbon dioxide concentrations in mainstream smoke are too low to present these risks. The level of carbon dioxide from a single cigarette does not exceed at any time exposure levels recommended by OSHA/NIOSH, and cumulative daily exposure is well below the OSHA/NIOSH recommended maximum exposure levels. Smoker exposure to carbon dioxide is also far below any levels that are known to cause significant physiological changes in man or animals. Mutagenicity tests indicate that cigarette smoke condensate from cigarettes expanded with carbon dioxide may be less biologically active than cigarette smoke condensate from unexpanded tobacco.

Background. Carbon dioxide (CO<sub>2</sub>; CAS No. 124-38-9) is a colorless, odorless, comparatively inactive and non-flammable gas (Compressed Gas Assoc. 1984). It may exist as a solid or liquid depending on the temperature and pressure; the solid phase is known as dry ice. Its boiling/sublimation point is -78.6°C.

2028705031